



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,652	07/21/2003	Michael Setton	015290-756	3865

7590 01/12/2005  
Peter K. Skiff  
BURNS, DOANE, SWECKER & MATHIS, L.L.P.  
P.O. Box 1404  
Alexandria, VA 22313-1404

EXAMINER
----------

POMPEY, RON EVERETT

ART UNIT	PAPER NUMBER
----------	--------------

2812

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

CA

<b>Office Action Summary</b>	<b>Application No.</b> 10/622,652	<b>Applicant(s)</b> SETTON, MICHAEL	
	<b>Examiner</b> Ron E. Pompey	<b>Art Unit</b> 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 October 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 22-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanchez (US 5,091,763) and further in view of Wu (5,880,508) and Moslehi (5,322,809).

Sanchez discloses the limitations of:

an interfacial layer (14, fig. 2), on a silicon semiconductor substrate;  
a gate electrode (16, fig. 2) of an electrically conductive material;  
a gate electrode having a width of less than 0.3 micron covering the high dielectric constant layer (col. 3, lns. 34-37);  
source and drain regions (18a-b and 22a-b, fig. 2) that are adjacent the gate electrode;  
a pair of spacers (24a-b, fig. 2) formed adjacent to the gate electrode;  
a pair of second spacers (20a-b, fig. 2) that are adjacent to the first spacers and formed on the lightly doped regions (col. 4, ln. 13 – col. 6, ln. 8); and

3. Sanchez does not disclose the claimed limitation(s) of:

a high dielectric constant layer (2, fig. 5a), that comprises a material that is selected from the group consisting of  $Ta_2O_5$ ,  $Ta_2(O_{1-x}N_x)_5$ , a solid solution of  $(Ta_2O_5)_r -$

Art Unit: 2812

$(\text{TiO}_2)_{1-r}$ , a solid solution of  $(\text{Ta}_2\text{O}_5)_s - (\text{Al}_2\text{O}_3)_{1-s}$ , a solid solution of  $(\text{Ta}_2\text{O}_5)_t - (\text{ZrO}_2)_{1-t}$ , a solid solution of  $(\text{Ta}_2\text{O}_5)_u - (\text{HfO}_2)_{1-u}$ , on the interfacial layer; and

wherein the insulator layer, with contact wholes, has a substantially planar surface;

wherein the interfacial layer comprises silicon nitride or silicon oxynitride; and  
a barrier layer between the gate electrode and the high dielectric constant layer.

However,

a. Wu discloses the above claimed limitations regarding:

a high dielectric constant layer (8, fig. 1), that comprises a material of  $\text{Ta}_2\text{O}_5$ ,  
wherein the interfacial layer (6, fig. 1) comprises silicon nitride or silicon oxynitride; and  
a barrier layer (10, fig. 2) between the gate electrode and the high dielectric constant layer in column 2, line 63 – column 3, line 20.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Sanchez with Wu, because the high dielectric constant layer provides for a gate insulator layer that reduces hot carrier effect and the barrier layer helps to provide better adhesion between the high dielectric constant layer and the gate.

b. Moslehi discloses the above claimed limitations regarding:

wherein the interlayer insulator is planar (46, fig. 3a) and silicide (41, fig. 2i) on the source and drain regions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Moslehi with Sanchez, because Moslehi the silicide on

Art Unit: 2812

the source and drain provide for a lower resistivity for better electrical conduction for metal contact and the planar insulator keeps topography level so preceding layers can be uniform.

c. Neither Sanchez, Wu nor Moslehi disclose:

the various high dielectric compositions, consisting of  $Ta_2(O_{1-x}N_x)_5$  wherein x ranges from greater than 0 to 0.6, a solid solution of  $(Ta_2O_5)_r-(TiO_2)_{1-r}$  wherein r ranges from about 0.9 to less than 1, a solid solution  $(Ta_2O_5)_s-(Al_2O_3)_{1-s}$  wherein s ranges from 0.9 to less than 1, a solid solution of  $(Ta_2O_5)_t-(ZrO_2)_{1-t}$  wherein t ranges from about 0.9 to less than 1, a solid solution of  $(Ta_2O_5)_u-(HfO_2)_{1-u}$  wherein u ranges from about 0.9 to less than 1. However, applicant does not disclose that these materials will provide unique or different results, when used in a device, from the  $Ta_2O_5$  material, listed in the group, disclosed by Wu. Therefore the other materials that are not shown by the prior arts of record are considered to be equivalent and a matter of design choice. No criticality has been placed on using one material over the other and therefore do not provide patentable distinction from the material given in the prior arts of record.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 22-40 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***


3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP


Art Unit: 2812

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ron E. Pompey whose telephone number is (571) 272-1680.

  
Ron Pompey  
AU: 2812  
January 10, 2005

  
RON POMPEY  
AU: 2812